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Canada. Dominion Fuel Board.



INTERIM REPORT OF THE DOMINION FUEL BOARD

1923

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1st Progress Report.

(Interim Report)
of the
Dominion Fuel Board



OTTAWA: CANADA
1923

No. 1

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Foreword

It should be noted, as serving to explain the scope and general nature of this report, that the Dominion Fuel Board is not essentially a part of the administrative machinery set up to cope with the recent difficulties due to fuel shortage in Canada. During the crises of the current year, as in previous crises, special control authorities have been created to assume the tasks of emergency administration. The work of the Dominion Fuel Board is to assist such bodies as much as possible during the continuance of emergency, but its chief duty does not pertain to the problems which present themselves only in such periods. Its primary purpose is rather to institute a thorough study of the underlying causes of recurring coal shortages and of the methods by which they may be counteracted. To that end a comprehensive programme of investigation has been planned which includes a series of exhaustive inquiries in different directions.

Thus the present report is necessarily of an interim nature. It covers mainly a statement of the broad facts relating to Canada's past and present position in regard to fuel supplies, coupled with a review of the various methods now advanced for strengthening that position and of the investigations planned or already initiated by the Dominion Fuel Board to ascertain the practical value of every promising source of permanent relief.

A Special Committee of the Senate has been organized to consider the question of the fuel supply of Canada, and the Board desires to express its appreciation of the co-operation of that Committee. The Board also hopes to obtain a fund of information from the proceedings of the House of Commons Select Committee on Mines and Minerals.

CHARLES CAMSELL,
Chairman, Dominion Fuel Board.

OTTAWA, CANADA,
MAY 21, 1923.


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Interim Report
of the
Dominion Fuel Board

THE events of recent years make it unnecessary to stress the urgency of Canada's fuel problem. They have given not only force but unanimity to the demand for sustained effort toward working out a national fuel policy. Although it is natural that the present determined public frame of mind on this subject is due almost entirely to the results of abnormal factors affecting the flow of coal supplies, it is also a fact, worthy of note but inadequately appreciated, that the coal trade of Canada invites thorough study even in periods entirely free from the spectre of shortage.

A Field Worthy of Investigation

During the ten-year period from 1912 to 1921, Canada's bill for imported coal exceeded the sum of $580,000,000 in round figures. In the same period the Canadian coal mining industry increased its output very materially, but the value of the total production from our enormous coal resources was considerably less than the sum of our payments for foreign coal. It is not necessary either to underestimate the natural obstacles in extending the use of native coals, or to set the desirable but doubtful objective of complete fuel independence, in order to warrant a systematic search for practicable methods of permanently readjusting a branch of Canadian commerce which has for many years yielded one of the main trade deficits of our national balance sheet and which has, with equal constancy, drawn its increased volume only in minor degree from natural resources within the Dominion.

Formation of Dominion Fuel Board

To study and make recommendations in regard to the various features of this problem and particularly with a view to making Canada independent, as far as possible, of foreign sources of supply, the Dominion Fuel Board was formally organized on the recommendation of the Minister of Mines, under the authority of an Order in Council dated November 25, 1922. Although the formation of the Board was prompted by the acute fuel situation then prevailing, the duties assigned to it were intended more particularly to meet a need pointed out in March, 1919, by Mr. C. A. Magrath when concluding his duties as Fuel Controller, and later emphasized strongly by the special committee appointed by the House of Commons during the session of 1921 to inquire into the future fuel supply of Canada. The status of the Fuel Controller and that of the special committee of the House of Commons was such as to limit the period of their respective activities, but in each case very broad investigations were conducted into the whole question of rendering Canada's position less insecure with regard to fuel supplies. In both instances the reports of their findings stressed the need of creating or designating some authority to keep in close touch with the fuel situation in Canada and to ensure constant study of the numerous factors tending to disturb, or potentially capable of relieving, it. The need of such an organization was again further emphasized in a very telling way by the ensuing fuel difficulties of 1922.

Definite action to implement the recommendations referred to above was delayed. Several branches of the Federal and Provincial services were pursuing independent studies bearing upon certain phases of the fuel problem, but no immediate steps were taken to constitute a board or other agency specifically charged with the duty of supplementing such studies, and of giving undivided attention toward working out a policy for the permanent solution or reduction of fuel troubles as distinct from temporary expedients to afford relief during periods of actual shortage. The delay was terminated by the trouble which developed in 1922. As in previous crises, machinery was first provided to handle the administrative problems directly related to tiding over the emergency. Later, the Dominion Fuel Board was formed to meet the long-recognized need for a standing organization which shall be definitely responsible for ensuring that systematic study of the fuel position of the Dominion be not permitted to lapse as soon as the current emergency ceases.

Functions and Personnel of the Board

The functions of the Board are not laid down within specific limits but are stated in terms sufficiently broad to permit the widest possible range of inquiry. The personnel is designed to coalesce the facilities of various Federal services in regard to geological, engineering, and economic studies relating to the fuel problem and to co-ordinate the results of their previous investigations, which, though conducted independently, have a common bearing upon that question.

A copy of the Order in Council (P.C. 2381) creating the Board follows:—

REPORT OF THE COMMITTEE OF THE PRIVY COUNCIL APPROVED BY HIS EXCELLENCY THE GOVERNOR GENERAL ON THE 25TH NOVEMBER, 1922.

The Committee of the Privy Council have had before them a Report, dated 8th November, 1922, from the Minister of Mines, submitting that in view of the present fuel situation, and of the recurrent conditions which have in the past disturbed the public mind and entailed much inconvenience, hardship and monetary loss, and particularly in view of the certain ultimate necessity of substituting other fuels for anthracite coal for domestic heating purposes in Central Canada, it is desirable that a thorough study of Canada's fuel problems be undertaken, with a view to arriving at such solutions as may be in the public interest.

The Minister states that in several Departments of the Federal Service, there are permanent officers who have been giving these problems extensive study, and have already accumulated in their respective offices a great deal of valuable information respecting the available fuel supply for Canada, and are engaged in investigations having a direct bearing on the solutions of these problems.

That the duties of advising upon, extending and supplementing the studies and investigations now in progress, looking to the solutions of these problems, can be most expeditiously, effectively and economically performed by a departmental Board composed of permanent members of the Federal Civil Service.

The Minister, therefore, recommends:

That there be created a Dominion Fuel Board charged with the duty of investigating and reporting upon this matter.

That this Board be authorized to secure all available data, to consult and co-operate with such individuals or bodies as they may deem specially qualified to advise upon any particular phase of this work and with the approval of the Minister to employ such technical assistance as may be found necessary.

That the expenses of the Board shall be met from the Mines Branch appropriation—"For the investigation of mineral resources . . . . . etc." upon certificate of the Chairman and Secretary when approved by the Minister of Mines.

That the Board shall consist of the following six officers, three to form a quorum, of which the first named shall be Chairman, the second named shall be the Vice-Chairman, and the last named the Secretary:—

Charles Camsell, Deputy Minister, Department of Mines;
John McLeish, Director, Mines Branch, Department of Mines;
B. F. Haanel, Chief of Fuel Testing Division, Department of Mines;
D. B. Dowling, Geologist, Department of Mines;
J. B. Challies, Director, Dominion Water Power Branch, Department of the Interior;
F. C. C. Lynch, Superintendent, Natural Resources Intelligence Branch, Department of the Interior.

That the Chairman, with the approval of the Minister, may add to the number of the Board additional members qualified to assist the Board in its work.

The Committee concur in the foregoing recommendations and submit the same for approval.

(S'g'd) RUDOLPHE BOUDREAU,
Clerk of the Privy Council.

To the membership, as named in the Order in Council, Mr. Roy Cameron, of the Dominion Forestry Branch, Department of the Interior, has since been added, and Mr. C. P. Hotchkiss has been appointed Executive Secretary.

Since the appointment of the Dominion Fuel Board, discussions in the Senate and in the House of Commons have clearly indicated that those who have given the subject serious and capable examination do not expect the Board, or any other fuel body, to be able to evolve an adequate national fuel policy within a specified time limit. The root of Canada's fuel problems is too deeply embedded in the natural handicap of certain parts of the Dominion and in the commercial intricacies of the highly-organized coal trade to permit of such an accomplishment. But it is expected, and it is the primary purpose of the Dominion Fuel Board, that the question of Canada's fuel supplies shall henceforth be subjected to sustained study regardless of whether the country's coal bins are for the time being empty or full, and that thorough investigation be made to determine the practical value of every project that may contribute some measure of permanent relief.

A commission has recently been appointed in the United States to determine the facts and evolve a solution relative to the labour, transportation, and distribution difficulties of that

country. The Dominion Fuel Board is in touch with this commission. Whatever solutions are arrived at by this body are to a considerable extent applicable to Canada, because labour organizations in the two countries are very closely associated and half of our present coal supply is drawn from that country.

The Problem Outlined and Measures Proposed to Solve It

In the limited time at the disposal of the Board since its appointment last year, opportunity has not been afforded for dealing in an exhaustive manner with many features of the problem confronting it, and the material which follows is, therefore, submitted merely as a progress report.

Central Canada, the Acute Fuel Area

The salient features of Canada's fuel problem are comparatively well known. The country has an abundance of coal but it is concentrated in the western and the eastern extremities, leaving the populous industrial section of Ontario and Quebec dependent on other sources of supply. The anomaly of this situation is heightened if we consider that Canada's present coal consumption is about 32 million tons annually as against known reserves of 1,234,269 million metric tons, sufficient for an unthinkably long period at the present rate of consumption. Although distance has prevented those deposits from supplying the needs of central Canada, this acute fuel area is but a few hundred miles

AVAILABLE COAL RESERVE OF CANADA

(In Millions of Tons)

(Estimated by the Geological Survey, 1913)

Province	Metric tons	Province	Metric tons
Nova Scotia	9,719	Alberta	1,072,627
New Brunswick	151	British Columbia	76,035
Ontario	25	Yukon	4,940
Manitoba	160	Northwest Territories	4,800
Saskatchewan	59,812	Arctic islands	6,000

Total reserves, all Canada..... 1,234,269

distant from the great coal regions of the United States, and it is upon that country, therefore, that Ontario and the greater part of Quebec have become peculiarly dependent for their fuel.

Dependence on the United States

The uncertainty of this single source of supply has been demonstrated again and again. The coal strike of 1902-03 bore particularly heavily upon Canada. The sufferings of the people in their homes and the enforced closing down of factories was not, however, without its meed of compensation, for no other single factor contributed so much to the rapidity with which the hydro-electric power movement, now the very breath of Ontario's industry, spread itself over the province. Neither is it without significance that the impulses that have stimulated the growth of the large private hydro-electric power developments and transmission systems radiating from Montreal and Shawinigan Falls in Quebec, acted with noticeable potency in the period immediately following the coal shortage in 1902-03. Since then, inconvenience, though less serious, has been caused periodically by freight embargoes and other transportation tie-ups in the United States. During the war, with its heavy demands for fuel in manufacturing and munition-making in both countries, the pinch of shortage was again felt and fuel rationing by Government authority once more brought home to Canada her dependency. The strike of United States coal miners in 1922, synchronizing as it did with the railway shopmen's strike, has been the last

CANADA'S COAL BALANCE SHEET

(In Millions of Short Tons)

	1913	1915	1916	1917	1918	1919	1920	1921	1922
Production	15·0	13·3	14·5	14·0	14·9	13·7	16·9	19·0	15·0
Exports	1·5	1·8	2·1	1·7	1·8	2·1	2·5	1·9	1·8
Imports—									
Bituminous	13·5	8·4	13·0	15·5	16·9	12·4	15·9	13·5	11·6
Anthracite	4·6	4·0	4·5	5·3	4·8	4·9	4·9	4·6	2·7
Consumption	31·6	23·9	29·9	33·1	34·8	28·9	35·2	31·2	27·5

painful incident to impress upon Canadians the danger of having to rely upon a single foreign country, albeit a very friendly one, for one of the prime necessities of life and industry.

Limited Reserves of Anthracite

The situation is further complicated by the circumstance that the people of central Canada have been so long accustomed to use United States anthracite for domestic fuel that they have become prejudiced in its favour. There are ample reserves of United States bituminous coal to satisfy all the needs of both countries for years to come, but the anthracite area, covering only some 484 square miles, has reserves that at the present rate of consumption will last only from 80 to 100 years. It is, however, from a small section of this area, known as the Wyoming Valley, favourably situated as to direct transportation facilities, that Canada draws her supplies; and this field is estimated to last, at the present rate of consumption, not more than 36 years. As the exhaustion of these reserves draws near, it is certain that the price will so increase that anthracite will become a luxury fuel in fact as well as in name.

Ample Supplies of United States Bituminous

The situation in respect to United States bituminous coal is far different. Unlike anthracite, the reserves of it are so large that they are described as practically inexhaustible. The mines have an annual capacity 300 million tons in excess of the needs of the United States, whilst Canada's imports of the fuel are about 14 million tons a year. Total bituminous reserves in the United

IMPORTATIONS OF UNITED STATES COAL INTO ONTARIO AND QUEBEC
(In Millions of Short Tons)

	1916	1917	1918	1919	1920	1921	1922
Into Ontario—							
Anthracite.....	2·95	3·09	3·62	3·44	3·24	3·07	1·64
Bituminous.....	10·68	13·31	13·01	9·25	12·34	10·71	9·44
Into Quebec—							
Anthracite.....	1·22	1·25	1·84	1·38	1·54	1·31	0·79
Bituminous.....	2·72	4·00	4·23	2·67	3·50	2·68	1·31

States are placed at 1,314,000 million tons. The fields are situated equally as well from the point of view of nearness and transportation facilities as are the anthracite fields. Barring labour and transportation difficulties, there is little doubt that central Canada will be able to secure large supplies of this coal.

Fuel for Domestic Heating, the Crucial Problem

Bituminous coal, however, has been used in Canada mainly for industrial purposes. The coking varieties, on account of their high volatile content, produce large quantities of smoke and soot, which makes them undesirable as a domestic fuel in their raw state. Therefore, notwithstanding the large reserves of this coal that our neighbour possesses, the problem of supplying central Canada with an acceptable fuel for domestic purposes remains unsolved.

Danger of Dependence on a Single Source of Supply

Added to this is the realization that it is not the part of prudence, if it can at all be avoided, to be dependent on a single source of supply, and a foreign one at that. True, our United States friends, from a business point of view, wish, under present conditions, to supply us with coal; true also that in times of scarcity we have been treated fairly, not to say generously, so far as official regulations are concerned; but these considerations must not be allowed to obscure the prudent, long-range point of view that the time may come when, not only temporary labour and transportation difficulties, but public opinion, which at times in a democracy is not always amenable to counsels of sober reflection, may intervene to so restrict the supply of fuel as to jeopardize our national existence. Two years ago the United States Bureau of Mines unofficially warned the Canadian Department of Mines that within a very short time Canada would have to work out her own solution for replacing the anthracite now imported from the United States. No less than three bills were recently before the United States Congress to place an embargo on the export of anthracite to Canada. They did not pass, but the fact that they were introduced indicates the drift of public sentiment. This contingency ever hangs above us like a sword of Damocles, and the Board considers it of the utmost importance that the use of coals of domestic origin should be more widely extended and that other native fuels should be more fully developed so that the sources of our fuel supply may be widened and diversified.

Dependence on Own Fuel Resources the Ideal

The ideal solution would be to make it possible to depend entirely on our own fuel resources. This may be accomplished to a greater degree than is now popularly thought to be possible.

Without doubt, a wider range of utilization can be effected for the coals of British Columbia, Alberta, and the Maritime Provinces. We have immense resources in waterpowers yet undeveloped. The extent and value of our peat deposits, the larger of them strategically situated in the acute fuel area, are just beginning to be realized. The farm wood-lot and the hardwood forests in the northern parts of Ontario and Quebec, as well as in the Maritime Provinces, can be made to assist more. The Board will make a searching inquiry into the extent to which these resources may be turned to better account.

The most obvious procedure was to examine whether it would not be possible to bring coal from the Maritime Provinces and from Alberta to supply Ontario and Quebec.

Coal from Maritime Provinces

Favoured with water transportation, coal from Nova Scotia and New Brunswick now penetrates into central Canada as far west as Ottawa. This coal is, however, bituminous and, therefore, as a domestic fuel is subject to the same prejudice, and labours under the same disadvantages as United States bituminous. If this coal were used in the making of domestic coke, however, partly displacing United States bituminous, it could materially assist in the solution of the domestic fuel problem.

Alberta Coal

Alberta coals range from lignite to semi-anthracite, although as yet a negligible quantity of the latter is produced. Grades lower than anthracite are used with satisfaction throughout the Middle West. During the last few years they have successfully competed with United States anthracite in Manitoba. Trial shipments have lately been made into Ontario, and the Board is co-operating with the Alberta government and the coal operators in having this fuel given a fair test. It has a distinct advantage over United States bituminous in being practically smokeless.

Inquiry into Transportation Rates

With both Maritime Province and Alberta coal, the crucial problem is one of transportation costs. Realizing this, the Senate Fuel Committee asked Sir Henry Thornton, President of the Canadian National railways, to ascertain the lowest rate which, under the most favourable operating conditions, could be accepted for the transportation of these coals to central Canada. After

due consideration Sir Henry has named a rate of $9 a ton for train-load lots from Alberta to Ontario during the months of May, June, and July, and has intimated that similar consideration will be given to rates on coal from the Maritime Provinces. Some further reduction may be possible by the use of the lake and rail route, but distribution charges and the price at the mine will also have to be materially reduced before any large movement of Alberta coal to Ontario may be expected.

To Investigate both Alberta and Maritime Province Coal Deposits

In both Alberta and the Maritime Provinces the Board is making arrangements to have a thorough survey made of the deposits of suitable coal that can be made available for the Central Canada market. This again is in keeping with the primary object of the Board to utilize our own fuels wherever possible. The Geological Survey will proceed with this investigation during the coming summer. In the event of a larger market being developed for Maritime Province coal in central Canada, it is important to know whether coal from there can be produced in greater volume than is now being done, and the Board is at present endeavouring to select an authority on this subject who will report on the possibility of increasing production.

Coking Bituminous Coal for Domestic Heating

The Board is convinced of the importance of an investigation into the feasibility of establishing by-product recovery coking plants in the larger centres of population. Not only are there the Nova Scotia and New Brunswick coals to draw upon, but, as stated before, there are immense reserves of United States bituminous coal that could be imported for coking. Briefly, the plan would be to establish coking plants at large well-situated centres of population like Montreal and Toronto, where the coke could be manufactured and shipped to tributary territory and the gas, which is the most important by-product, used at the point of manufacture. Other valuable by-products, such as tar, ammonium sulphate, and benzole, are obtained, and the success of such an industry depends on the disposal of these. Great improvements have been made in the technique of the manufacture of domestic coke even very recently, and the product made is much superior to the ordinary gas-house coke. It is a dense material of approximately the same heating value as anthracite, and it should be produced at a price to compete with it.

Some years ago in the cities of St. Paul and Minneapolis a plant was established for the manufacture of this coke. Today it has displaced anthracite there practically in its entirety. The Chairman of the Board investigated this plant last year and found that, not only were the two cities above referred to being supplied, but shipments were being made to Winnipeg. More recent investigation by the Board in other parts of the United States, where coke is being manufactured and used for domestic purposes, has confirmed the conclusion that this should be a very fruitful field for further investigation. The Board considers that developments in this connexion hold out so much promise that it has by resolution placed on record its decision to employ a competent expert to report upon the matter.

Waterpower Resources

Canada, and central Canada in particular, has large developed and undeveloped resources in waterpower. As at January 1 last, it is estimated that the available 24-hour power at minimum

Available and Developed Waterpower in Canada

Province	Available 24-hour horsepower, 80 p.c. efficiency of utilization		Horsepower of turbines actually installed
	At ordinary minimum flow	At estimated flow for maximum development	
British Columbia	1,931,142	5,103,460	328,977
Alberta	475,281	1,137,505	33,067
Saskatchewan	513,481	1,087,756	
Manitoba	3,270,491	5,769,444	134,025
Ontario	4,950,300	6,808,190	1,299,230
Quebec	6,915,244	11,640,052	1,073,883
New Brunswick	50,406	120,807	42,039
Nova Scotia	20,730	128,264	47,100
Prince Edward Island	3,000	5,270	2,239
Yukon and Northwest Territories	125,220	275,250	13,199
	18,255,295	32,075,998	2,973,759

flow slightly exceeded $18\frac{1}{4}$ million hors epower, of which approximately 3 million is developed. Ontario and Quebec are estimated to have nearly 12 million horsepower available, of which slightly less than $2\frac{1}{2}$ million has been developed. The coal equivalent of waterpower is taken as 9 tons per year per horsepower of turbines installed.

Heating by Electricity Impracticable at Present

Except in an auxiliary capacity, the Board is of the opinion that electric house heating is impracticable on a large scale, both on account of the large amount of power it would take and the ordinary cost of it. Added to this is the fact that the peak load for heating would be superimposed on the peak load for power. It has, however, been computed that with anthracite at $17 per ton and electricity at 0·425 cents per kwh. the costs would balance without considering the saving of labour.

Electricity to Replace Coal for Industrial Use

Although, at present, the use of electricity for house-heating purposes does not hold out great promise, it is important to note that its use will, for industrial and transportation purposes, set free a large amount of coal for heating. It would take nearly 27 million tons of coal to produce the horsepower now developed annually in Canada, and over 21 million tons to produce that being generated in the acute fuel area of Ontario and Quebec.

In the six-year period, 1916-21, Canada exported on the average to the United States, hydro-electric power equal to over 43 per cent of all the anthracite we imported from that country. Our exports of both coal and hydro-electric power in that period were equal to over 68 per cent of our anthracite imports. The import of all classes of coal from the United States into Canada is only 3 per cent of the total United States production—the import of anthracite is only 2 per cent of the United States production.

Peat Resources

Too little attention has been directed to the importance of the peat resources Canada possesses. These are very large and are strategically situated in Ontario and Quebec where coal is lacking. The total area in Canada overlain by peat bogs is estimated at 37,000 square miles, of which the central provinces of Manitoba, Ontario, Quebec, and New Brunswick have 12,000 square miles with an average depth of 6 feet. This 12,000 square

miles will produce 9,300,000,000 tons of peat equivalent in heating value to 5,400,000,000 tons of good coal.

The Department of Mines have investigated and mapped about 228,000 acres of peat bogs, comprising 46 bogs in Ontario, 27 in Quebec, 7 in Manitoba, and 27 in the Maritime Provinces, estimated to be capable of producing 199,450,000 tons of fuel. Seven bogs within shipping distance of Toronto are estimated to be capable of producing 26,500,000 tons; seven in the vicinity of Montreal, 23,500,000 tons; and five bogs on the lower St. Lawrence conveniently situated as regards water transportation to Quebec, 16,250,000 tons of fuel. The economic shipping distance for peat fuel is approximately 100 miles.

Satisfactory Process of Manufacture Evolved

Experiments conducted by the Dominion Government, and latterly by the Dominion and Ontario Governments acting together, at Alfred, Ontario, have produced a high-grade auxiliary fuel. The quality of the fuel turned out last year was much superior to that produced in earlier experiments. It is not recommended as the equal of anthracite for heating in the three winter months, but makes a satisfactory fuel for domestic furnaces in the spring and autumn and for use in grates and cook stoves at all seasons. Its chief disadvantage is that it is bulky, a ton of peat occupying more than twice as much space as anthracite of equal heating value.

The process evolved at Alfred is a simple one, consisting of the reduction of the moisture in the raw peat by drying by sun and wind. The chief problem has been to reduce labour cost, and this has been done by designing suitable labour-saving machinery. The Peat Committee in charge have designed a plant to produce 20,000 tons annually which, on a 20-hour a day schedule, they estimate can make peat fuel at a cost of $3.50 a ton f.o.b. Alfred. It is stated that peat can be retailed at as high as $10 to compete with anthracite at $16.50 a ton.

Should be Used as Auxiliary Fuel

The Board is of the opinion that peat should be utilized to supply a part of the fuel needs of central Canada, and if the results accomplished last year at Alfred are not sufficient to induce private capital to engage in the production of this fuel, further encouragement should be given the industry by the governments concerned.

Wood for Fuel

Canada has a further fuel resource in her supplies of wood, especially of hardwood. Like peat, it is an auxiliary fuel, and it suffers from similar disadvantages, bulkiness and restriction of use within quite a limited transportation radius. But, unlike peat, its good points as a fuel are well known. Unfortunately the reserves of hardwood in Ontario and Quebec within the thickly settled districts have, of necessity, been largely depleted, and where land is of more value for agriculture than for forest products, this depletion must be expected to continue.

Solving the Problem of Hardwood

So far the most valuable woods, from a merchantable point of view, in Canada's forests, have been the softwoods, and it has always been a problem with lumbermen to keep the hardwoods from crowding out the softwood species on cut-over lands. If a field of utilization can be found for these as fuel, one of the most important problems in forestry economics will have been solved.

Extent of Hardwood Resources

The principal fuel hardwoods in Canada, including beech, maple, and yellow birch, are found south of a line drawn from lake Superior to Saguenay river. The information about these resources is meagre and incomplete, but it is estimated that there is from $7\frac{1}{2}$ to 8 million acres of young and mature hardwood in Ontario, in addition to 3 to $3\frac{1}{2}$ million acres of cut-over land, which, if not required for agriculture, could be used to produce wood fuel. Quebec has about 8 million acres of hardwood lands with 2 to 3 million acres of cut-over lands, New Brunswick has possibly 3,800,000 acres, and Nova Scotia 2,500,000 acres. All told, there is probably about 150 million cords of hardwood in eastern Canada. The hardwood areas, being largely cut-over, are particularly exposed to fire damage. It is impossible to arrive at an estimate of the annual growth, but it is doubtful if this, in Ontario and Quebec, exceeds 2 million cords. The amount of hardwood used annually approximates one cord per capita.

Utilizing Waste Wood

At present wood comprises approximately one-quarter of the per capita fuel consumption in Canada, and there is no doubt that our wood resources, under proper management, could be utilized to a greater degree than at present. Farm wood-lots are

not managed from a silvicultural point of view, municipal forests on land unsuitable for farming could be established in many places, and better use could be made of waste from sawmills and other wood-using factories. The sawmill waste of Canada is estimated to be equal in fuel value to 1,760,000 tons of coal. An important development in utilizing this material by carbonizing and briquetting has recently been put into practice in the state of Washington.

Oil and Natural Gas

Oil, oil-shales, and natural gas have never provided Canada with any appreciable amount of fuel. An oil field of limited area in southwestern Ontario has been producing almost as long as the Pennsylvania fields, but for a number of years it has shown signs of exhaustion. In recent years oil has been found in Alberta and the Northwest Territories, and although prospects are encouraging, no large quantities have yet been produced. The oil-shales of New Brunswick and Nova Scotia, though promising, have not been utilized to any extent. There are supplies of natural gas in southwestern Ontario and in Alberta, but in both fields evidences of depletion are shown. The possibility of the petroleum and natural gas resources of Canada assisting appreciably in the solution of the fuel problem is not bright.

Foreign Sources of Fuel Supply

The foregoing is a rapid survey of our own fuel resources and the steps that have been taken to date by the Board to find out how they may be made to serve better the needs of the acute fuel area. There are, however, sources of supply beyond our own borders, other than United States anthracite, which may contribute to our needs, and the Board realizes that it is of the first importance to increase the number of fields upon which we may draw.

Although it is highly desirable that in the matter of such an essential commodity as coal, this country should be entirely independent, it is a fact that no country in Europe or America, with the exception of Great Britain, is in that fortunate position. All import more or less coal, and although some of them, as Germany and the United States, produce more coal than the home market can consume, certain parts of their territory are more easily supplied with foreign than domestic coals. Each coal field in Europe had, before the war, its recognized market,

which was determined mainly by the cost of transportation, the quality of its coal, the character of the demand, and, only slightly, by political boundaries. Germany, before the war, particularly affords an illustration of the commercial disregard of political boundaries induced by freight rates.

Welsh Anthracite

The most likely source of supply beyond our own borders, outside the United States, is undoubtedly the coal fields of South Wales. Welsh anthracite is of a higher grade than Pennsylvania anthracite, but it breaks up more in shipment. It contains almost 90 per cent carbon and about 3 per cent ash. This coal was imported into several Canadian cities during the past winter and assisted materially in relieving the shortage. It should, however, be sized and the fines separated out.

Total Production Just Equals Canadian Consumption

The annual production of Welsh anthracite ranges from 4 million to 5 million tons, or just about the tonnage consumed yearly by Canada. Half of the production is consumed in Britain. At present from 200,000 to 300,000 tons could possibly be spared for Canada, but production is capable of increase as demand arises. Reserves of this class of coal approximate 6,000 million tons.

Favourable Freight Rates

Swansea, the port of shipment, is distant from Montreal 3,000 miles, but the cost of carriage is only about $2.14 (9 shillings) a ton, compared with $4 and over from the Pennsylvania anthracite fields, and around $1 water transport from Nova Scotia.

It is understood that Welsh coal firms are now canvassing the situation with the idea of shipping to St. Lawrence River points and building sizing and screen facilities there. The movement is one that will be determined entirely by economic considerations.

United States Bituminous

The use of United States bituminous coal in the production of coke for domestic heating has already been dealt with. On account of the large reserves, the proximity to points of consumption, and the well-organized transportation systems, the possibility of coking this coal at points not capable of being

served by our own coals, holds promise of being a partial solution of our domestic fuel problem in central Canada, and a thorough investigation by an expert has been decided upon, as heretofore described.

More Efficient Utilization of Fuels

Measures for the more efficient utilization of fuel will contribute materially towards conserving the available supplies. The use of coal in a pulverized form, thereby ensuring complete combustion, is a development of recent years which is proving successful for industrial uses in certain other countries, especially in the United States. The lower grades of fuel can be employed by this process. The Mines Branch has already carried out some investigations in regard to the extent to which pulverized fuel can be used in Canada, and arrangements are being made by the Board to extend these investigations.

Central Heating Plants

An investigation will also be conducted under the supervision of an expert into the advisability of establishing central heating plants in centres of population. Several such plants are in operation now in Canada and quite a number are known to be in successful operation in the United States and in Europe. Through their ability to use low-grade fuel and because of economy in delivery of fuel at one central point and in the disposal of ashes as well as in the possibility of securing trained engineers, they are said to reduce the cost of heating considerably. Possibly the largest central heating plant in Canada is that operated by the Dominion Government to heat the Parliament and some other government buildings in Ottawa.

Consumers' Conservation

The Board realizes that a broad opportunity for service exists in the rather difficult field of educating the consumer to utilize fully the fuel he is able to obtain. The insulation of heat pipes, the weather-stripping of doors and windows, proper methods of firing and management of draughts, are points which, if properly observed, would lessen the amount of fuel needed. Only a thorough and persistent campaign of educational publicity will be effective in this field, and the Board will undertake such a campaign.

Other Conservation Measures

Other measures for the conservation of fuel are under consideration. For example, there is no doubt that better house building would save much fuel. The building of insulated houses to retain the heat and keep out the cold is a field in which but little investigation of a scientific nature has been done. Another sphere of investigation might well be experimentation with various types of furnaces and heaters, old as well as new, to ascertain whether more efficient designs can not be developed. During the past winter the Board was instrumental in having the Fuel Testing Plant of the Mines Branch conduct experiments in burning various types of fuel on the market, in an ordinary domestic furnace. Coke, peat, Welsh anthracite, bituminous coal, and the smaller sizes of anthracite, together with various mixtures of these fuels, were experimented with and the results given to the public in pamphlet form. This, with the kind co-operation of the Post Office Department, was placed in the hands of every householder in the acute fuel area, and wide publicity to its recommendations was also given in the press.

Educating the Public Away from Anthracite

The Board is aware that the coal-consuming public have a decided predilection in favour of United States anthracite. Indeed, in many cases it is really a prejudice so deeply ingrained as to result in refusal to give even a fair trial to substitutes. Especially in spring and autumn substitutes can be used to advantage, not only as regards saving in expense to the householder, but also in respect of the bearing it has on ameliorating the difficulties of fuel supply generally. The Board has been persistently fighting this unreasonable prejudice and will continue to do so with all the means at its command.

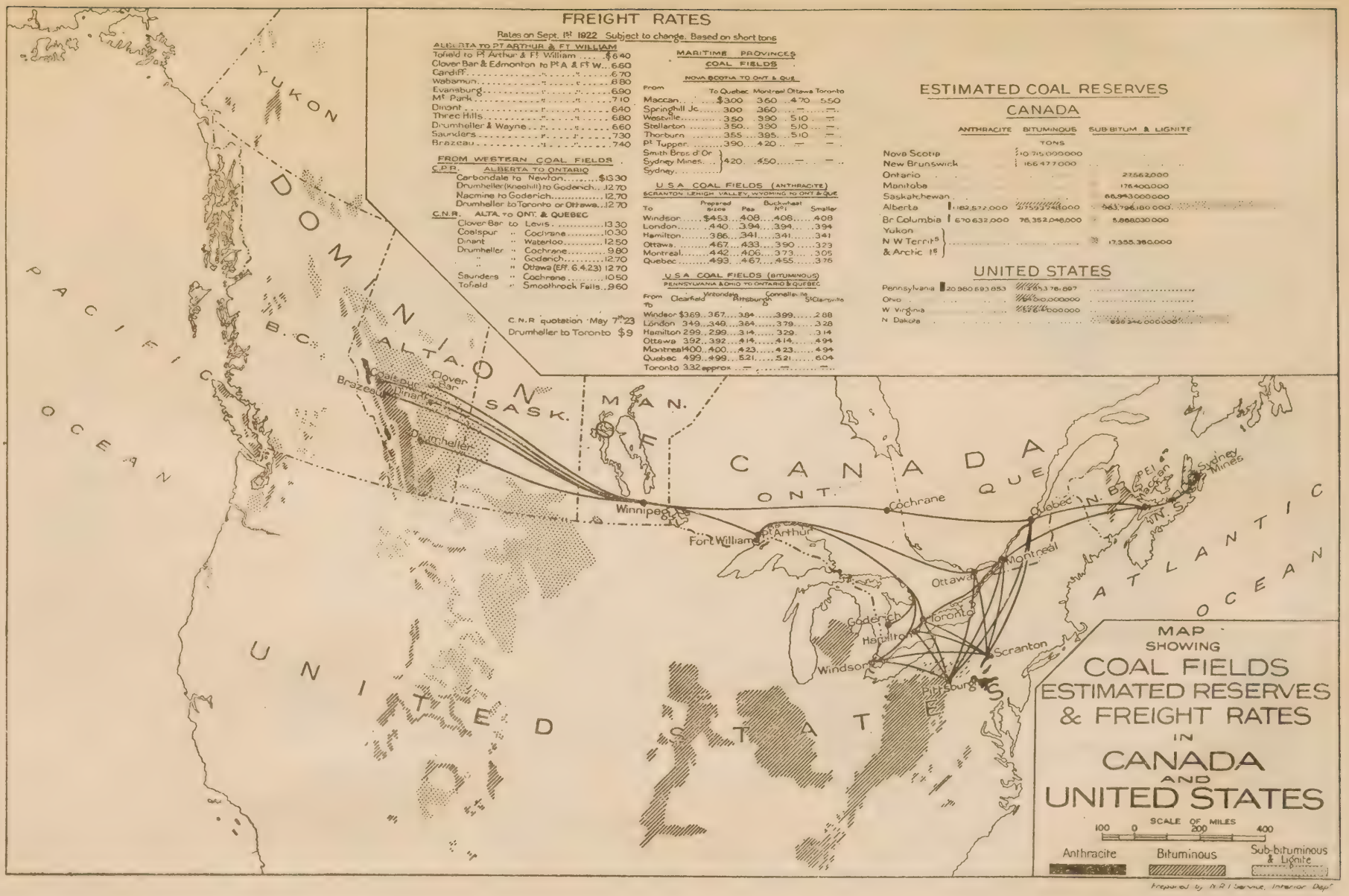
United States Anthracite Replaced in Manitoba

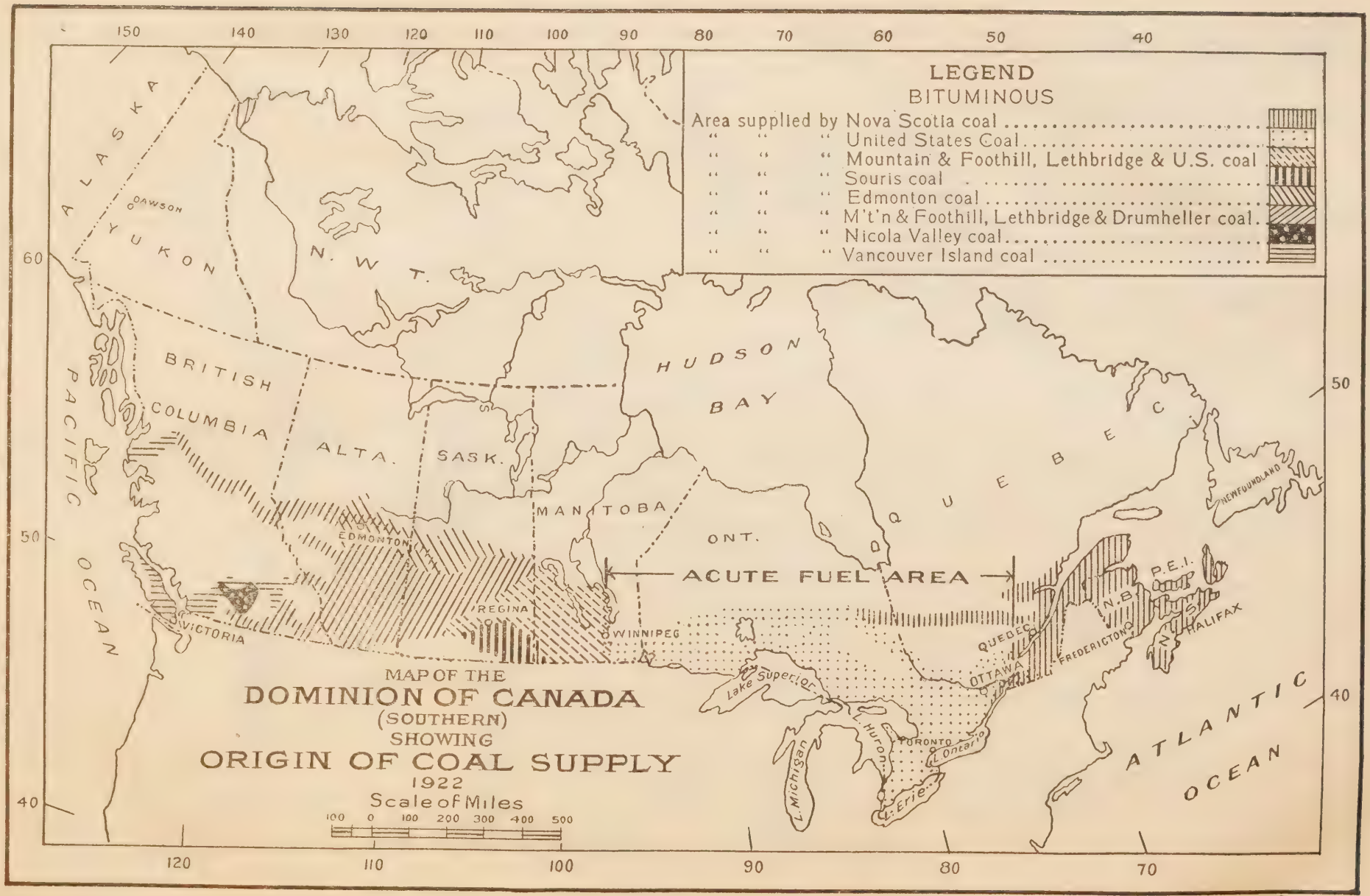
No more convincing instance of the delusion of the public by such a prejudice is afforded than in the circumstances surrounding the entry of Alberta coal into the Manitoba market. Prior to the war the needs of the province for domestic heating were supplied almost entirely by United States anthracite. After that country entered the war, the demand at home became so great that the Fuel Administration in 1918 had to cut the supplies of Manitoba in half.

At a public meeting in Winnipeg, when Mr. C. A. Magrath, the Canadian Fuel Controller, made this announcement, all kinds of protests and objections were made. It was stated that Canadian coal was not suited to the needs of the people of Manitoba and that untold hardship and suffering would result. But they did not. Under compulsion the people of Manitoba found that Alberta coal was well suited to their needs and have continued its use long after fuel control ceased. Today Alberta domestic coals have practically driven United States anthracite from the Manitoba market. Last winter approximately 75 per cent of the coal used for domestic purposes was mined in Canada. Had the war not compelled coal consumers in Manitoba to use Canadian coal they would probably still be under the delusion that only United States anthracite could be used to heat their homes.

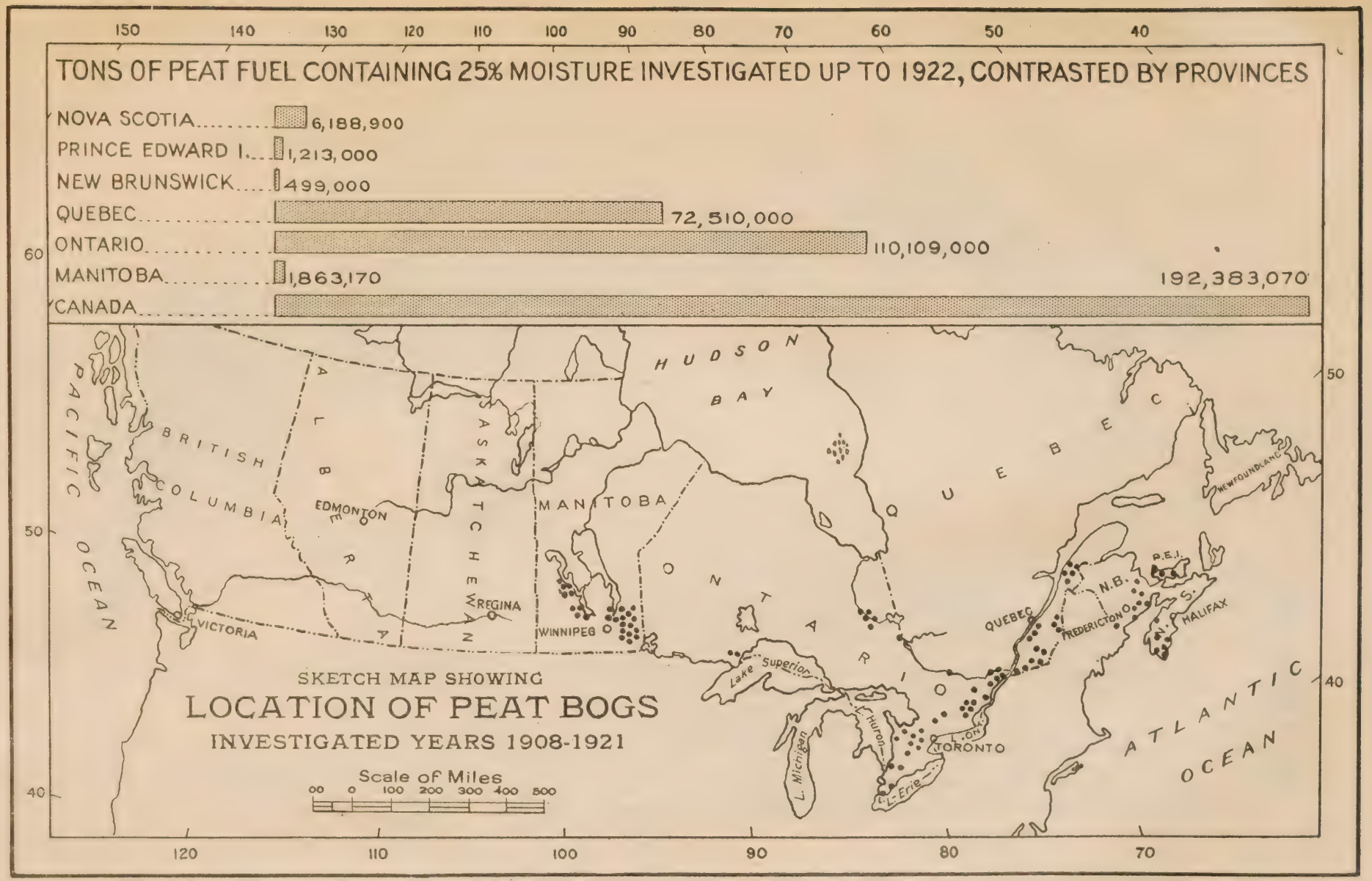
False Sense of Security a Danger

In conclusion, the Board wishes to emphasize the need of keeping the pressing nature of the fuel problem before the public mind. After passing through a period in which our supply of anthracite from the United States has been interrupted and restricted by an unusual combination of labour and transportation difficulties, it is only natural to expect a period of several years comparatively free from such unusual circumstances. When the usual supply is forthcoming, there will be a tendency to forget the relentless approach of the time when the anthracite fields are nearing exhaustion, when prices will rise to prohibitive heights for the ordinary citizen, and when the pressure of public opinion in the United States will prevent exportation to Canada. Easing in the anthracite supply, that of necessity can be only temporary, will likely be the strongest force tending to prevent other fuels, including our own, gaining a foothold in the Central Canada market; and it brings with it another danger no less real in the sense of false security it engenders in the mind of the coal consumer in the acute fuel area. Your Board, appointed as a permanent body to work consistently for a lasting solution of the problem, will do its utmost to keep a long-distance view before the public mind, and to emphasize the constant need of developing the use of substitutes for the fuel on which central Canada has so long depended.

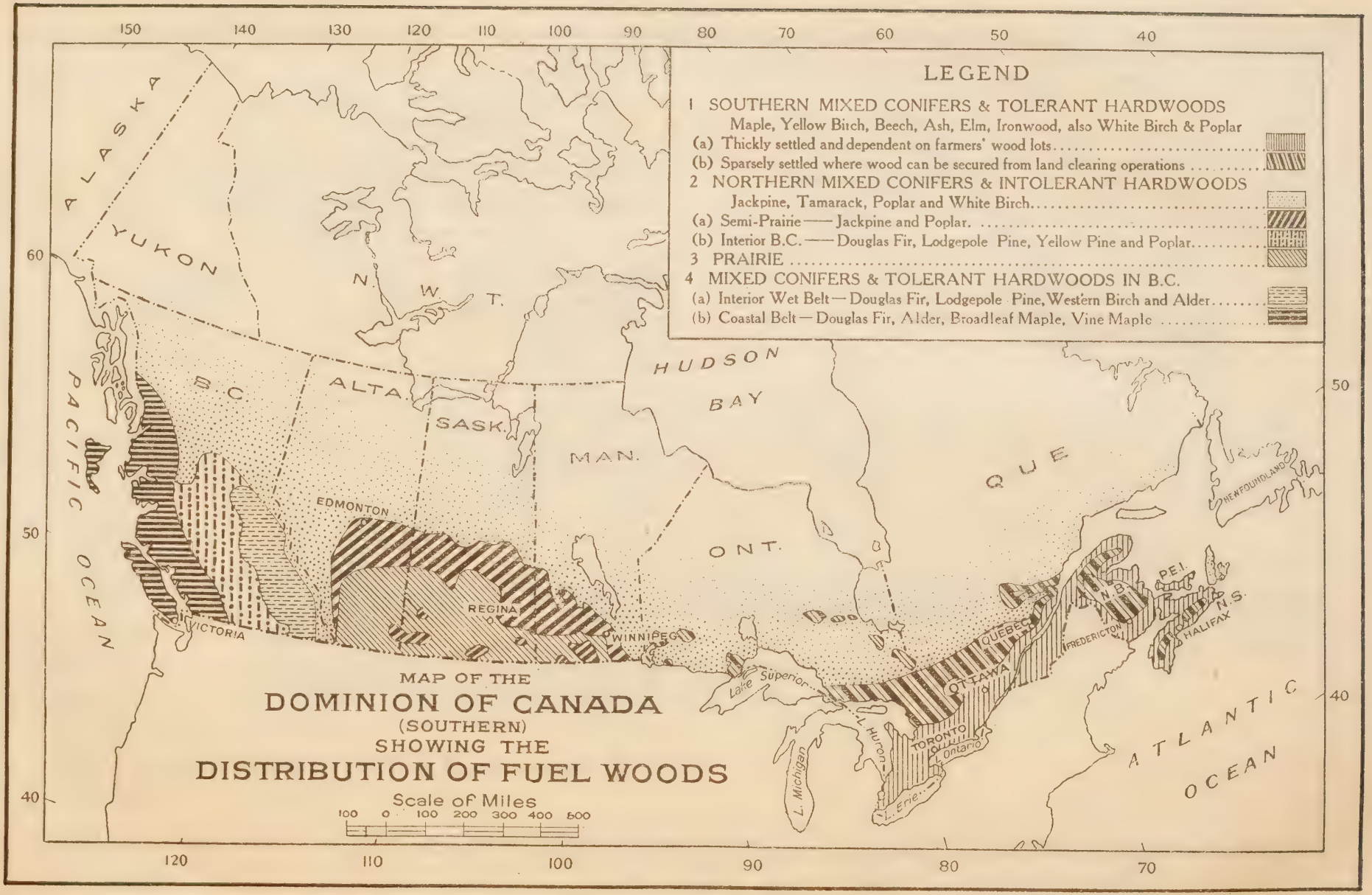

FREIGHT RATES
Rates on Sept. 1st 1922 Subject to change. Based on short tons
ALBERTA TO PT ARTHUR & FT. WILLIAM
Tofield to Pt Arthur & Ft William ... $6.40
Clover Bar & Edmonton to Pt A & Ft W... 6.60
Cardiff ... 6.70
Wabamun ... 6.80
Evansburg ... 6.90
Mt Park ... 7.10
Dinant ... 6.40
Three Hills ... 6.80
Drumheller & Wayne ... 6.60
Saunders ... 7.30
Brazeau ... 7.40
FROM WESTERN COAL FIELDS
C.P.R. ALBERTA TO ONTARIO
Carbondale to Newton ... $13.30
Drumheller (Knee hill) to Goderich ... 12.70
Nacmine to Goderich ... 12.70
Drumheller to Toronto or Ottawa ... 12.70
C.N.R. ALTA. to ONT. & QUEBEC
Clover Bar to Levis ... 13.30
Coalspur " Cochrane ... 10.30
Dinant " Waterloo ... 12.50
Drumheller " Cochrane ... 9.80
" " Goderich ... 12.70
" " Ottawa (Eff. 6.4.23) 12.70
Saunders " Cochrane ... 10.50
Tofield " Smoothrock Falls .. 9.60
C.N.R quotation May 7th 23
Drumheller to Toronto $9
MARITIME PROVINCES
COAL FIELDS
NOVA SCOTIA TO ONT & QUE
From / To Quebec / Montreal / Ottawa / Toronto
Maccan ... $3.00 3.60 4.70 5.50
Springhill Jc ... 3.00 3.60 — —
Westville ... 3.50 3.90 5.10 —
Stellarton ... 3.50 3.90 5.10 —
Thorburn ... 3.55 3.95 5.10 —
Pt Tupper ... 3.90 4.20 — —
Smith Bros d'Or / Sydney Mines ... 4.20 4.50 — —
Sydney ...
U.S.A. COAL FIELDS (ANTHRACITE)
SCRANTON LEHIGH VALLEY, WYOMING TO ONT & QUE
To / Prepared sizes / Pea / Buckwheat No1 / Buckwheat Smaller
Windsor ... $4.53 4.08 4.06 4.08
London ... 4.40 3.94 3.94 3.94
Hamilton ... 3.86 3.41 3.41 3.41
Ottawa ... 4.67 4.33 3.90 3.23
Montreal ... 4.42 4.06 3.73 3.05
Quebec ... 4.93 4.67 4.55 3.76
U.S.A. COAL FIELDS (BITUMINOUS)
PENNSYLVANIA & OHIO TO ONTARIO & QUEBEC
From / To Clearfield / Vintondale / Pittsburgh / Connellsville / St Clairsville
Windsor $3.69 3.67 3.84 3.99 2.88
London 3.49 3.48 3.64 3.79 3.28
Hamilton 2.99 2.99 3.14 3.29 3.14
Ottawa 3.92 3.92 4.14 4.14 4.94
Montreal 4.00 4.00 4.23 4.23 4.94
Quebec 4.99 4.99 5.21 5.21 6.04
Toronto 3.32 approx
ESTIMATED COAL RESERVES
CANADA
ANTHRACITE / BITUMINOUS / SUB-BITUM & LIGNITE
TONS
Nova Scotia ... 10,715,000,000
New Brunswick ... 166,477,000
Ontario ... 27,562,000
Manitoba ... 176,400,000
Saskatchewan ... 66,943,000,000
Alberta ... 1,162,572,000 / 275,952,410,000 / 963,796,180,000
Br Columbia ... 670,632,000 / 76,352,048,000 / 5,868,030,000
Yukon
N W Territs & Arctic Is ... 17,355,360,000
UNITED STATES
Pennsylvania ... 20,980,893,853 / 69,376,897
Ohio ... 150,000,000
W Virginia ... 126,000,000
N Dakota ... 858,240,000,000
YUKON
B.C.
ALTA.
SASK.
MAN.
ONT.
QUE
N.B.
P.E.I.
N.S.
CANADA
UNITED STATES
PACIFIC OCEAN
ATLANTIC OCEAN
Coal Cliff
Clover Bar
Brazeau
Dinant
Drumheller
Winnipeg
Fort William
Pt Arthur
Cochrane
Quebec
Sydney Mines
Montreal
Ottawa
Toronto
Goderich
Hamilton
Windsor
Scranton
Pittsburg
MAP SHOWING
COAL FIELDS
ESTIMATED RESERVES
& FREIGHT RATES
IN
CANADA
AND
UNITED STATES
SCALE OF MILES
100 0 200 400
Anthracite
Bituminous
Sub-bituminous & Lignite
Prepared by, N.R.I Service, Interior Dep't



Prepared in N.R.I. Service



Prepared in the N.R.I. Service



Prepared in the N.R.I. Service.

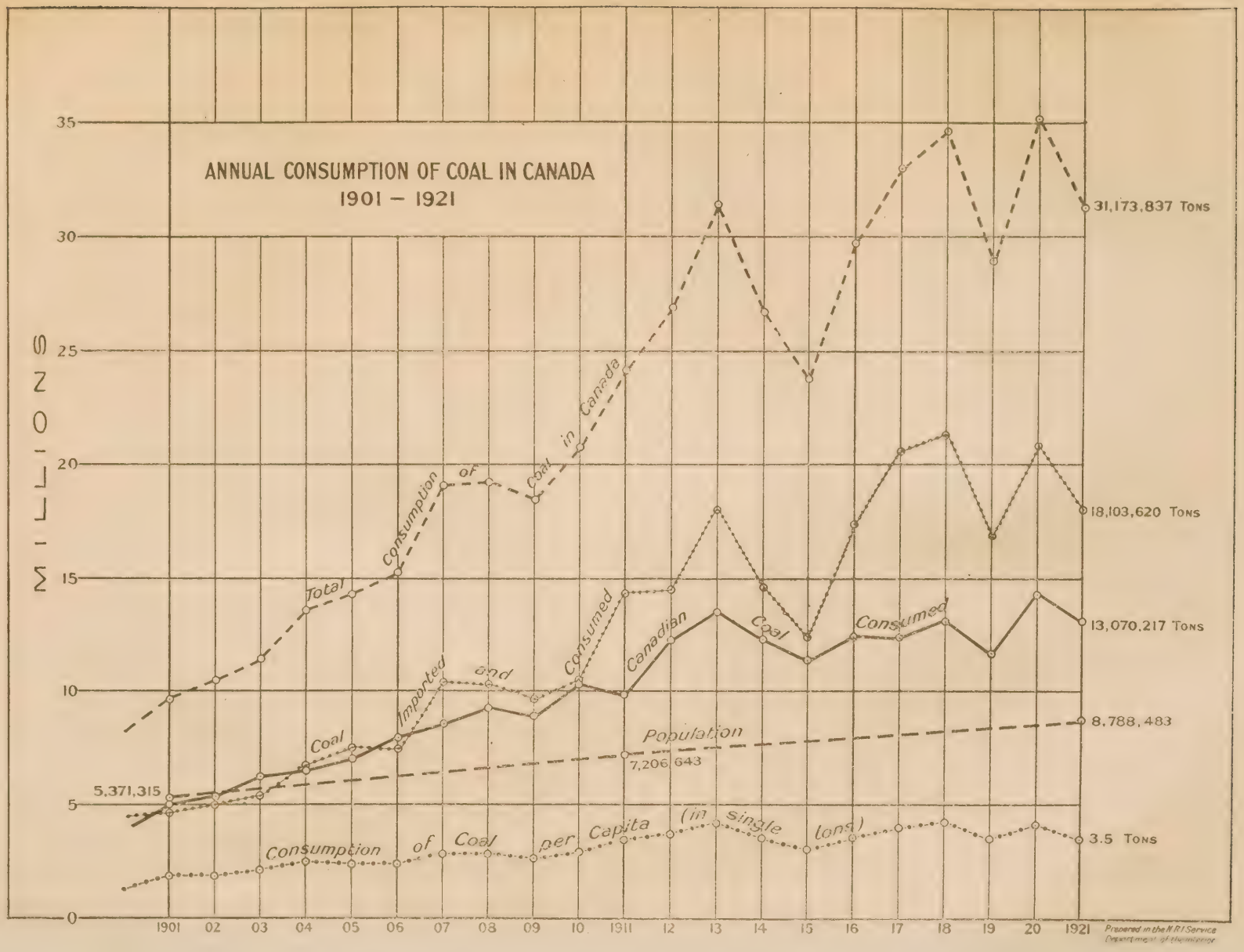

ANNUAL CONSUMPTION OF COAL IN CANADA
1901 – 1921
MILLIONS
35
30
25
20
15
10
5
0
1901 02 03 04 05 06 07 08 09 10 1911 12 13 14 15 16 17 18 19 20 1921
Total Consumption of Coal in Canada
31,173,837 Tons
Canadian Coal Consumed
18,103,620 Tons
Imported and Consumed
13,070,217 Tons
Population
8,788,483
7,206,643
Coal
5,371,315
Consumption of Coal per Capita (in single tons)
3.5 Tons
Prepared in the N.R.I. Service
Department of the Interior

CHART Nº 1

COAL SUPPLY OF CANADA BY PROVINCES

OUTPUT & DISTRIBUTION

1922

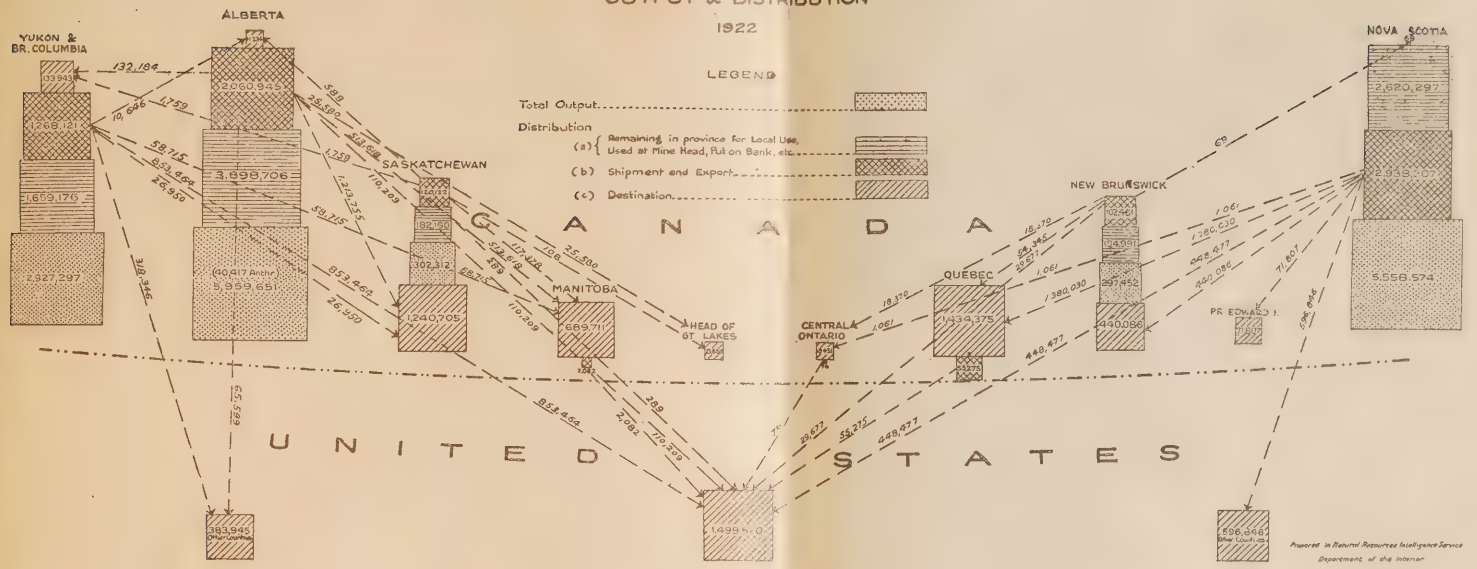
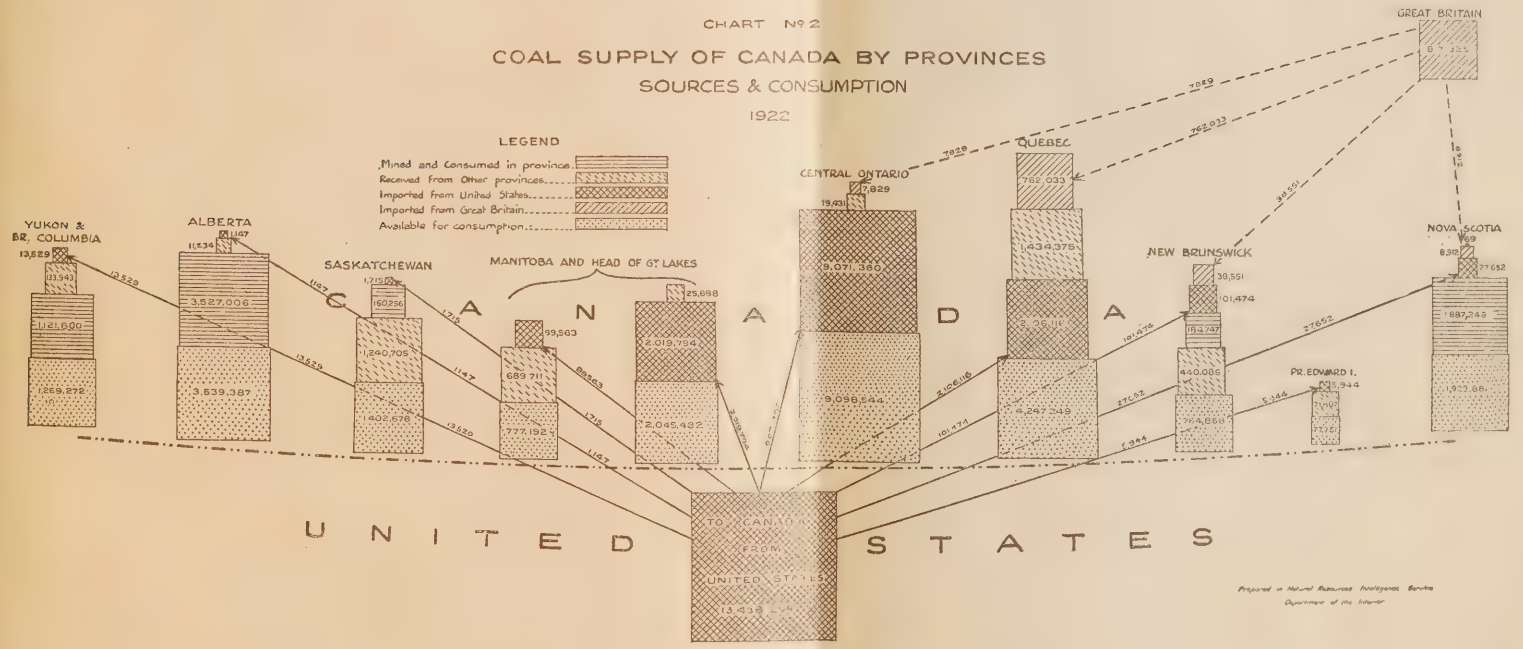


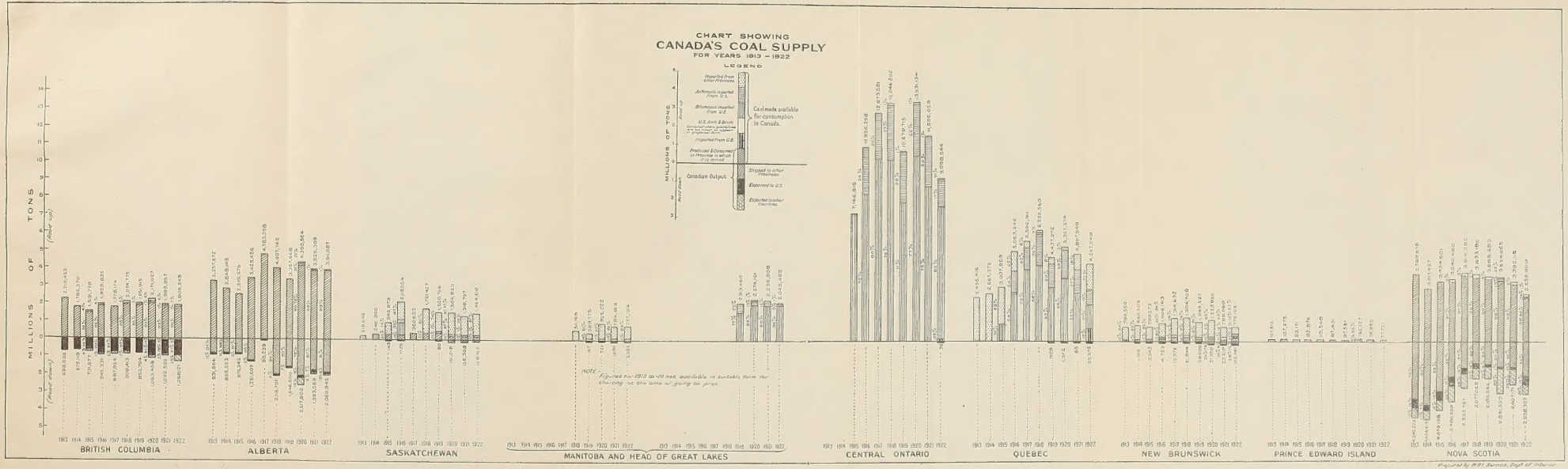
CHART Nº 2

COAL SUPPLY OF CANADA BY PROVINCES

SOURCES & CONSUMPTION

1922




CHART SHOWING
CANADA'S COAL SUPPLY
FOR YEARS 1913 - 1922
LEGEND
Imported from other Provinces
Anthracite imported from U.S.
Bituminous imported from U.S.
U.S. Anth. & Bitum. Combined where quantity for each cannot be shown separately on graphical chart.
Imported from U.S.
Produced & Consumed in Province in which it is mined
Coal made available for consumption in Canada.
Canadian Output
Shipped to other Provinces.
Exported to U.S.
Exported to other Countries.
MILLIONS OF TONS
MILLIONS OF TONS (Added up)
BRITISH COLUMBIA
ALBERTA
SASKATCHEWAN
MANITOBA AND HEAD OF GREAT LAKES
CENTRAL ONTARIO
QUEBEC
NEW BRUNSWICK
PRINCE EDWARD ISLAND
NOVA SCOTIA
NOTE Figures for 1913 to 18 not available in suitable form for charting at the time of going to press.
Prepared by Mines Branch, Dept. of Interior

OTTAWA
F. A. ACLAND
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1923